

Notice of Allowability

Application No.

10/632,068

Examiner

Meagan S Walling

Applicant(s)

JING, CHARLIE

Art Unit

2863

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 7/31/03 application.
2. ☒ The allowed claim(s) is/are 1-4.
3. ☒ The drawings filed on 20 February 2004 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 07312003
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Allowable Subject Matter

Claims 1-4 are allowed.

The following is an examiner's statement of reasons for allowance:

The primary reason for the allowance of claim 1 is the inclusion of the limitation of a) selecting seismic velocity functions $v(z)$ at at least two lateral (x_s) locations (at least three locations for 3D application) in said subterranean region, the number of such locations being determined by the degree of lateral velocity variation; b) transforming said common offset seismic data traces from the space-time ($x-t$) domain to the wave number - frequency ($k-\omega$) domain; c) calculating a travel time map for each x_s location using the velocity function selected for such location; d) calculating for each travel time map from step (c) a corresponding map of τ as a function of wave number ρ , where $\omega\tau$ is the phase shift in the $k-\omega$ domain corresponding to the migration time shift in the $x-t$ domain, e) using the τ -maps to find $\tau(\rho)$ as a linear function of x with a certain slope at each depth (z) in the subterranean region; f) forming the migrated image from said seismic traces in the $\omega-k$ domain using pre-stack time migration with k shifted by an amount equal to the τ slope from step (e) multiplied by ω ; and g) reverse transforming the migrated time ($x-t$) domain. It is this limitation in the claimed combination that has not been found, taught, or suggested in the prior art that makes these claims allowable.

The primary reason for the allowability of claim 4 is the inclusion of the limitation of a) selecting seismic velocity functions $v(z)$ at at least two lateral (x_s) locations (at least three locations for 3D application) in said subterranean region, the number of such locations being determined by the degree of lateral velocity variation; b) transforming said common offset

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seismic data traces from the space-time (x - t) domain to the wave number - frequency (k - ω) domain; c) calculating a travel time map for each x_s location using the velocity function selected for such location; d) calculating for each travel time map from step (c) a corresponding map of τ as a function of wave number ρ , where $\omega\tau$ is the phase shift in the k - ω domain corresponding to the migration time shift in the x - t domain, e) using the τ -maps to find $\tau(\rho)$ as a linear function of x with a certain slope at each depth (z) in the subterranean region; f) forming the migrated image from said seismic traces in the ω - k domain using pre-stack time migration with k shifted by an amount equal to the τ slope from step (e) multiplied by ω ; and g) reverse transforming the migrated time (x - t) domain; h) using the migrated images from the step (g) to assess the commercial hydrocarbon potential of the subterranean region; and i) producing any hydrocarbons identified in step (h). It is this limitation in the claimed combination that has not been found, taught, or suggested in the prior art that makes these claims allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wiggins (US 6,643,590) teaches a method for determination of seismic wave travel times from a surface location to at least one subsurface computation point.

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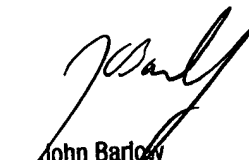
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Meagan S Walling whose telephone number is (571) 272-2283.

The examiner can normally be reached on Monday through Friday 8:30 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

msw


John Barlow
Supervisory Patent Examiner
Technology Center 2800